

Natural Architecture Project: Bamboo Modular Coordinated with Systematic Structure

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Abstract

Andaman west coast in the Southern of Thailand is the most popular in Ecotourism and is developing to be the world class ecotourism area. However, people in this area do not much improve their quality of life, especially the local tribal called Lei. (Mariners who are inhabiting the west coast of Thailand). This Natural Architecture Project is an architecture project which aims to help the people and improve the ecotourism to be more sustainable by using the Homestay System. In other words, the Homestay System will help Lei by letting them have their own residence and making their own money by providing their residence for tourists. The Natural Architecture Project is designed by concerning the Lei's lifestyle combining with the Standard Homestay System. This design does not only respond to the local lifestyle, tourists can also be fully touched by nature and impressed with a local life. Further, this project considers and uses local material. It is easy for construction by using local labor and tools. Moreover, it also has less environmental impact as much as possible (Buranasompob, 1996). This study starts on Lei's life community, then analyzes the geography, marks the place or area for the first prototype to be landed. After that, the researchers form the project to put in Lei's residence, study local materials which can be found in their environment. Finally, we try to put our design into the right place to get the most functions out of the space limit that they have. Hence, the result of this study aims to introduce an innovative homestay which can be constructed and deconstructed, rebuilt by using each particle which is easy to build up in various areas. Each homestay can be separated from each other and can also be united and rebuilt as one building. Bamboo is picked to be a main material for this design construction and this material has been used by locals for so long. The researchers, then, adapt it with a new material to make the design stronger and easier to be rebuilt again and again. This design is a prototype which will help the locals who have lived on the west coast in the southern Thailand. The design aims to further use in some other area too which depends on each location.

Keywords: *bamboo structure, modular coordinated system, home stay*

1. Introduction

Thailand has high incomes from their Tourist Industry and one of the most famous tourists is Ecotourism. Andaman seashore, west coast of Thailand, turns to be the most popular ecotourism location. The government has a plan to develop this area to be a world class ecotourism area within their 4 years National Developing Plan (Starting from 2014 – 2017). This plan also focuses on Sustainable Tourism which creates an amount of the country's income by considering Natural Resource and Carrying Capacity under the vision "The Center of Sea Life World Class Ecotourism by Basic of Using a Local Natural Resourcing of Agriculture and Strength of Community".

This plan totally supports and tries to develop this area to be the Center of Sea Life Ecotourism but it does not improve the quality of life of the locals in this area called "Lei" which has around 41 communities, about twelve thousand people, including 5 provincial areas of Andaman Seashore, Pang Nga, Phuket, Krabi, Trang and Satul. Lei has to face a consequence of fast track of development which is certainly unsecure and brings conflict into their communities, their lifestyle and cultures (Kongpan, 2003).

Natural Architecture Project is a kind of architecture which will help people to develop and improve their Ecotourism as Sustainable Homestay. Tourists will get an idea and consciousness by this homestay. This project will allow local community to take part in managing and solving tourism problems which may affect the local environment. Locals will get profits from this system such as environmental awareness, maintaining their local lifestyle and cultures alongside with tourists will come and experience

the truly local lifestyle. Furthermore, the design of Natural Architecture Project uses a local material to help people to decrease their cost of investment and construction. It is easy to construct and also adapt the design that responds to the highest utility and functional with less harm and less effects to the environment. This design will be a prototype or choice for the people or community who wishes to apply in their area to respond with their own confiscates.

2. Objectives

1. Study the Lei's lifestyle to design a homestay which suits local lifestyle and the tourists will get truly experience local life
2. Study the Thai Homestay Standard to design and also the safety and good services which the tourist will get
3. Study local material to help and improve the design and also additional safety of the tourist or the local residence
4. Study about the easily ways to construct and deconstruct, easily to rebuilt by the local, local tools or laborers which will help to decrease the cost and less environmental impact (Momtastic webecoist, 2011)
5. Study bamboo structure that can be used to solve difficult construction problems and address space management issues in different contexts

3. Materials and Methods

The researchers designed by considering the information that was obtained from local lifestyle, analyzing the geography and weather in the area, choosing the first prototype to be laid down in this project, studding local materials to create and apply to the researcher's design and trying to build the arrangement.

The design reflects local life and must respond to the 3 needs of this project:-

1. Utility of the space or area: it has to respond the Lei's Lifestyle and applies with a Thai Homestay Standard (Department of Tourism is formulating from Tourism Authority of Thailand, 2017).
2. Prototype Based Area: the researcher chose 5 Thai Homestay Standard namely: Natural Resources, Tourism Program which Local Acceptance, Natural Resources and Environmental Management, Local Life, Cultures and Traditions, and easily to get into this area. The researchers chose Baan Kor Chang, Village No.2, Kor Pha Yarm Sub-District, Muang District, Ranong Province.
3. Local Information: for studying the natural resources and environment, geography and weather, economy, local material, re-growing replacement, cost of construction including labor and other materials needed, technology which local people can apply and rebuild by themselves.

4. Results and Discussion

Our design is adapted from the traditional of Lei's residence and lifestyle by using local material to redesign the residence to be more functional and tourists will get a better experience of local life and environment. Our design still uses the same material which Lei used in the past but was designed to make it much more suitable and look more modern and also strengthening and easily to construct and re-construct (Teartisap, 2002).

The researcher's innovative thinking and concept in Figure 1 is designed by considering that the homestay can separate as a piece apart and can put it together by modular coordinate system like rebuild it up to be 1 unit, each unit can be put together as a one big residence or building and can separate this 1 big building to be a 1 homestay unit later. Since the concept of our homestay design was supposed to be easily separate and rebuilt later, it can combine each homestay to be 1 big unit or separate it to be many homestays, so the researcher's design would separate each part by:

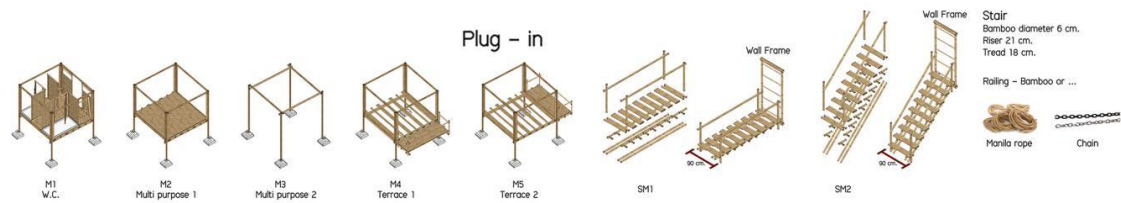


Figure 1 Example of bamboo unit format and ladder depending on each location confiscate

Bunting in Figure 2, the researcher's chose a concrete bunting. Since the researcher's would put it on land and the structure is bamboo which has a very light weight and easy to move, the researcher's would use bunting and stick it with bamboo of the structure by using a 6 millimeters metal sheet to strengthen the structure. This can carry the weight building in case they have to put it on a sloped area, therefore two types of bunting were developed:

- Scalable Bunting: if they have to build their house on a sloped area, they can adjust the bunting by using the same slope of bunting and put it on that area immediately.
- Scalable of Pillars Structure: they will use the same size of bunting which cannot be adjusted. However, they have to adjust the size and length of each pillar structure to match with the slope instead.

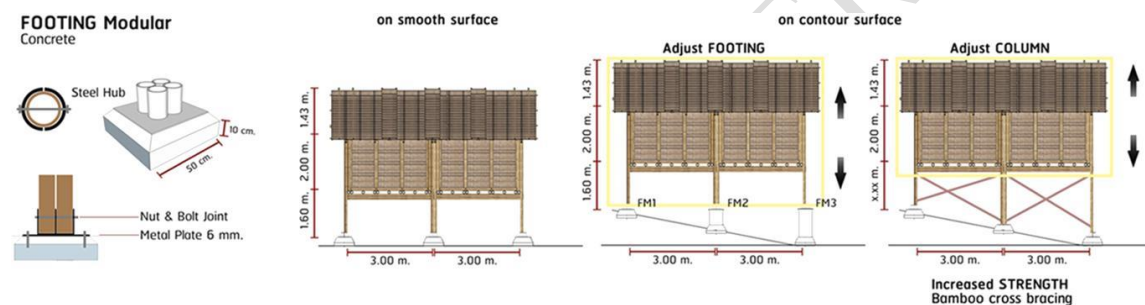


Figure 2 Example of bunting for which depending on each location confiscate

Floor Structure, was designed to be a set of a floor which included a beam and joist like any other wood construction. The researcher just put joist 25-30 centimeters apart from each other to strengthening it up. Then, the researchers put beams over it, with this joist and beam set will 1 floor set of each 1 homestay unit. The researchers can adjust the beam and joist as was desired but the top ceiling will be the same. The researchers also added more beams which the owner can adjust the length of to create their homestay's balcony. The researchers chose flattened bamboo to be the homestay's floor. As for the toilet and shower room, the researchers chose fiber glass which is quite cheap, easy to construct and to clean and strong enough to use. For the water system, the researcher chose instant water pipes and system which can easily move and build or it can be redesigned as the owner wants their homestay to be.

Wall in figure 3-4, we design the wall which can change or apply to be a door or windows to increase the space light or wind flow as they want. We choose strips of bamboo leaves or some other local materials such as woven bamboo mat (Sansena, 2014).

The researchers have 4 designs of roofs and ceilings. Each of it has the similar principle of construction by putting a "Purlin" in the beginning of a "Rafter." Then, the researchers used some wood to lock it up with a roof ceiling such as "Thatch Roofing" or some kind of modern materials such as "Polyethylene Thatch Roofing". With this roof construction, it can be counted as 1 set of roof ceiling of each homestay. After that, the researchers put it on a "Stud Beam", "King Post" and "Ridge." These 3 are apart from the roof set to be a roof substratum containing a roof set. So, each homestay unit can be put together by the front or side of the building only where it can cover and hide the seam as follows:

1. The researchers would use some to stick the roof from each unit thatch roofing as you may see in Figure 5, Roof Connection 01 or;

2. The researchers may use a bamboo water trough as you may be seen in Figure 5, Roof Connection 02.

Concerning the design in Figure 6-9, the researchers created each part of each unit that does not use any new or modern technology. The researchers simply systematically rearrange their traditional homestay or residence. The researchers studied and designed their house to be easier to separate, reconstruct and low maintenance. Also, their utilities and functions can apply as possible as the locals want.

Interior of each homestay in each unit, the researcher chose fiber glass for a water system and the toilet because of its strength and light weight which is convenient to move and clean. As for the electric system of each unit of the homestay, the researcher used an electrical generator because Kor Chang still has no electrical system available for a government unit. Electrical generators use depends on how many buildings they want or have since 1 electrical generator is provided per 1 building of each unit of the homestays. Moreover, there is also a time controller to switch on and off each homestay or building unit.

Wall – Patition Modular

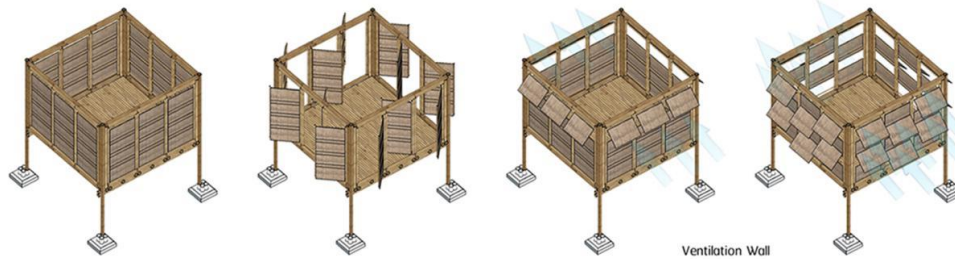


Figure 3 Wall and partition wall modular coordination system

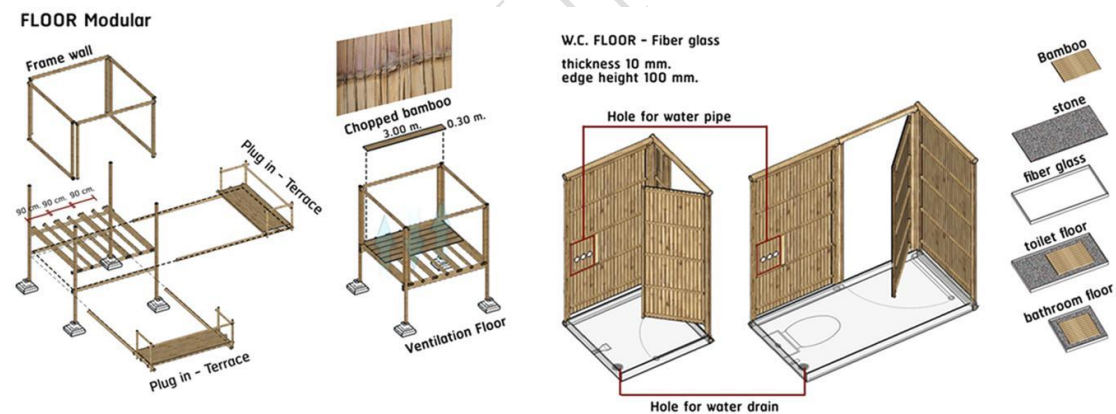


Figure 4 Floor structure unit format and floor material

ROOF Modular

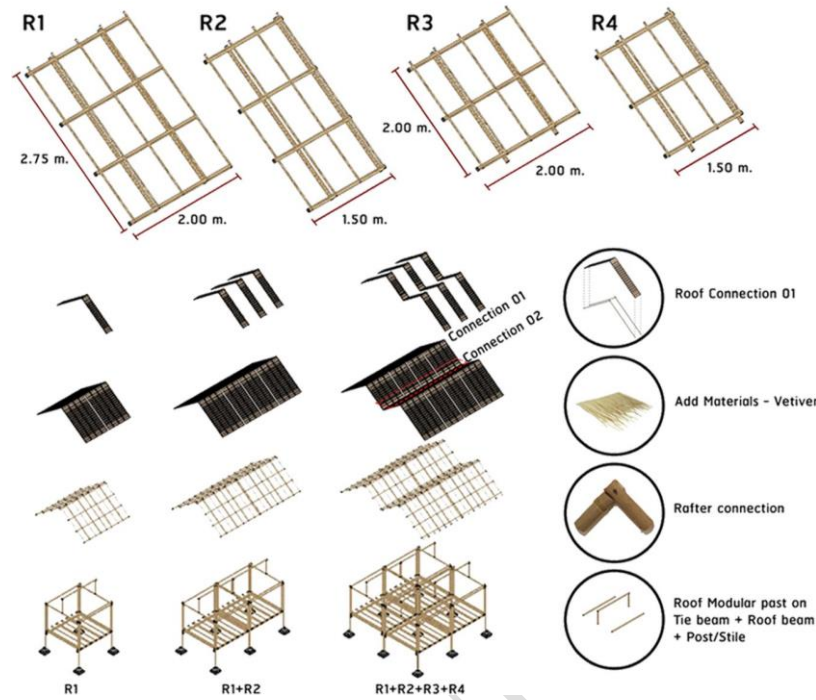


Figure 5 Roof structure unit format (Roof Connection 01,02)

PLAN - HOMESTAY 01

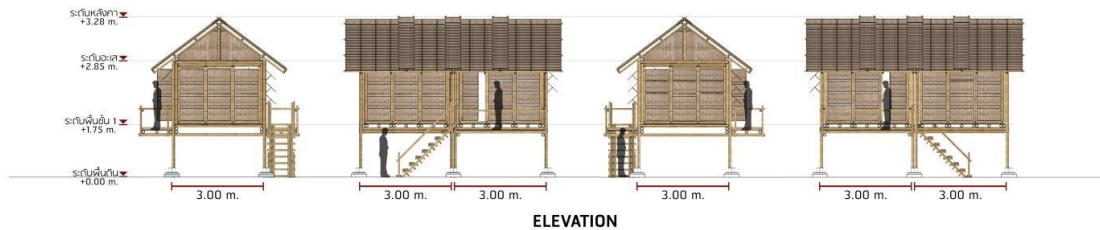
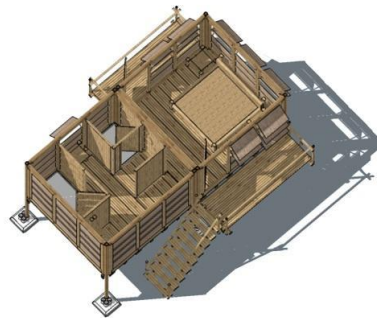
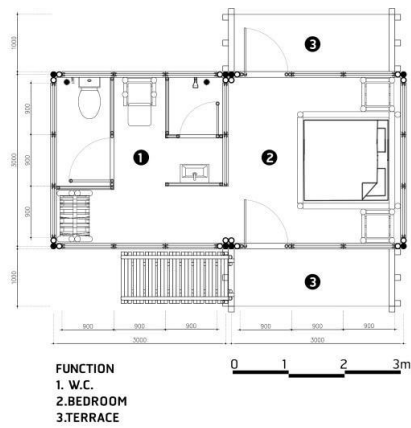


Figure 6 Example of homestay combining 2 units

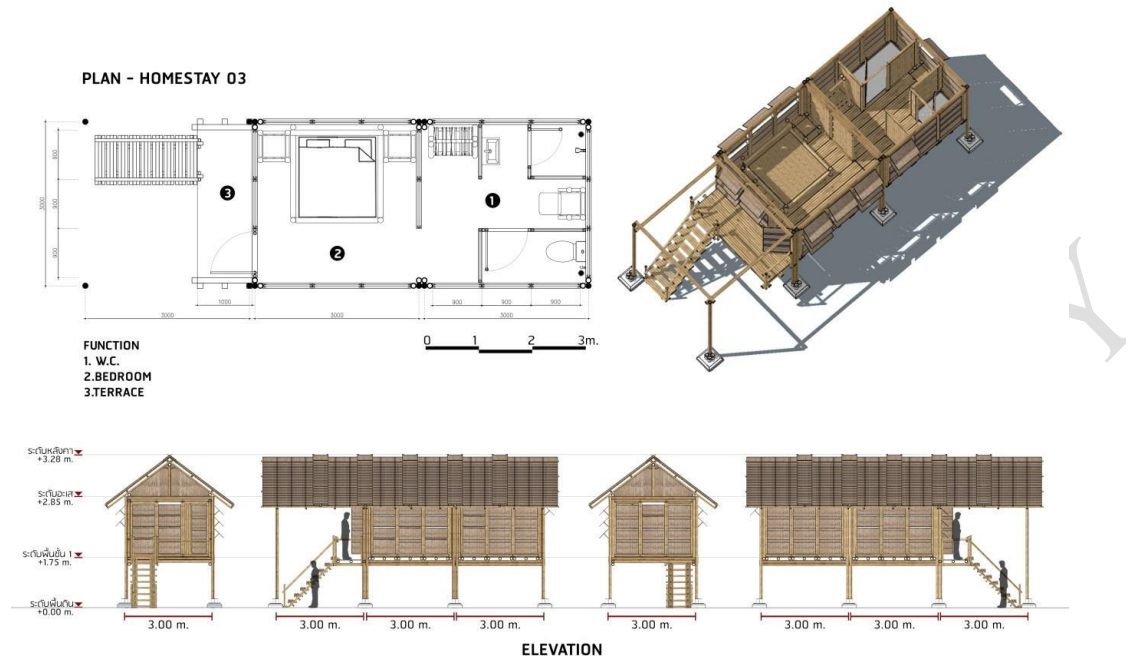


Figure 7 Example of homestay combines 3 units

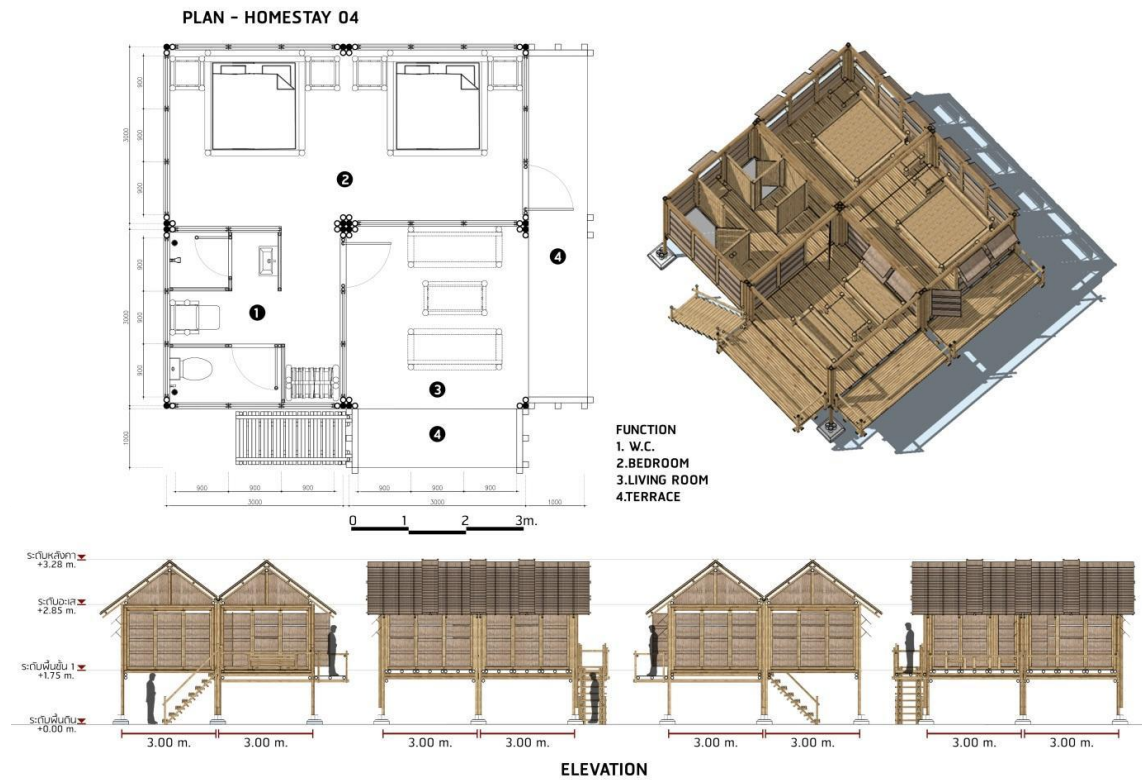


Figure 8 Example of homestay combines 4 units

5. Conclusion

The Natural Architecture Project is the project which would utilize local natural resources and well known around Thailand as Bamboo, which is easy to find and has been used to build Thai houses since the past (Bambooroo, 2011).

Many owners of homestay or hostel design the accommodation or their place by using bamboos in many areas which help them to lower costs of construction because of its wide availability and none of them are modern or complicated to construct.

Our concept of design and construction of this project comes from the idea that the researchers wanted to use real Lei's local life and residence combining with a modular coordinating system by using bamboo to create an accommodation for tourists. The researchers designed each functional unit in 9 square meters, 3 meters x 3 meters. Each unit consists of bedroom, living room, kitchen and this space can be adjusted to be a toilet by using a shower tray or adding another toilet in. Then, if the researchers put each unit or combine each unit together with a different task, they can put it in a row by using a joint or structure tools. Then, the researchers can create a building where they can potentially contain tourists.

At last, this Natural Architecture Project is designed by considering the material which is easy to find, decompose, construct, rebuild, and maintain by locals. Moreover, the material also maintains the identities of local and traditional Thai building style that can be recreated and rebuilt in any part of Thailand. Bamboo is good to be grown in every place which locals can reproduce by balancing between reproduction and consumption it. With these reasons, they can lower the costs of production, and can sustain their economy and turn to be a good role model for the community.

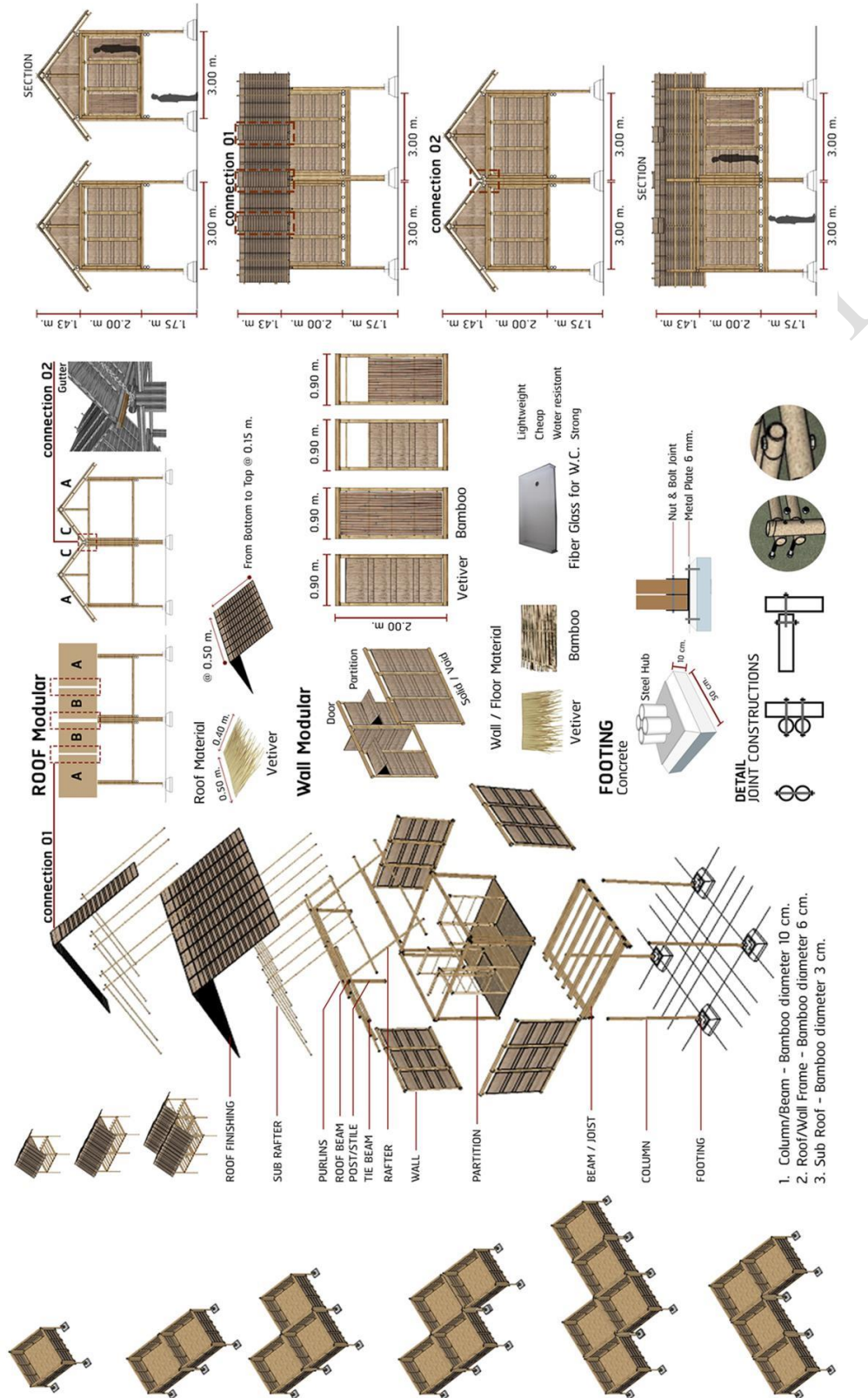


Figure 9 Consolation and building design overview

6. Acknowledgements

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